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ABSTRACT

Using linked individual and census tract data from the 1980 U.S. Census, it is found that when a teenage boy drops out of school depends not only on his family background and the increase in earnings associated with graduating, but also on the characteristics of the neighborhood in which he lives. Both the good and bad dimensions of neighborhood quality appear to influence dropping out of school. The relationships between some neighborhood variables and dropping out are not linear, but there is no evidence to support the theory of Johnathan Crane (1991) that when neighborhood quality falls below a critical level, school dropout rates increase sharply. Fifteen tables and two figures illustrate the analysis. Two appendixes consider sample selection and interactions between individual and neighborhood characteristics. (Contains 19 references.) (SLD)

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Neighborhood Effects on Dropping Out of School among Teenage Boys

Rebecca L. Clark
The Urban Institute
2100 M Street, Washington, DC 20037

Discussion Paper Series

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Rebecca L. Clark
The Urban Institute
2100 M Street, Washington, DC 20037

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Neighborhood Effects on Dropping Out of School among Teenage Boys

Rebecca L. Clark
The Urban Institute
2100 M Street, Washington, DC 20037

Using linked individual and census tract data from the 1980 U.S. Census, I find that whether a teenage boy drops out of school depends not only on his family background and the increase in earnings associated with graduating, but also on the characteristics of the neighborhood he lives in. Both the good and bad dimensions of neighborhood "quality" appear to influence dropping out. The relationships between some neighborhood variables and dropping out are not linear, but there is no evidence to support Crane's (1991) theory that when neighborhood quality falls below a critical level, school drop-out rates increase sharply.

Whether, and if so how, neighborhood characteristics influence the chances that a teenager will drop out of school has been the subject of considerable research. Crane (1991), Brooks-Gunn et al. (1992), and other authors reviewed in Jencks and Mayer (1991) all report that neighborhood factors influence the likelihood of dropping out even when family characteristics are taken into account. Crane reports, further, that this is not a linear effect--but that when neighborhood quality falls below a critical level an "epidemic" effect sets in, leading school drop-out rates and other social problems to escalate.

Investigating such questions is beset with well-known measurement problems, not least of which is the lack of neighborhood information in data sources most frequently used to study children.

Crane, for example, investigated the relationship between neighborhood characteristics and the probability of dropping out of school using data from the 1970 census. To do so he approximated neighborhoods using sets of census block groups that were not necessarily homogeneous or contiguous. With the cooperation of the U.S. Bureau of the Census, I was able to match information on the microdata files from the 1980 census with census tract information. Census tracts are explicitly defined, with the help of local committees, to be economically and socially homogeneous (U.S. Bureau of the Census 1983a).[1] This matching allows me to examine the effects of both individual and neighborhood composition on the likelihood of teenage boys dropping out of school, using considerably better definition of neighborhood than was available

[1] Census tracts are small statistical subdivisions containing 2,500-8,000 residents. All SMSAs contain census tracts; nearly all are completely tracted (U.S. Bureau of the Census 1983a, Appendix A:8-9).

to Crane. (Unlike Crane, who included both males and females in his sample, I limit the analysis to boys because dropping out of school among girls is often related to childbearing, increasing the complexity of the analysis.)

I find that neighborhood quality does matter, but that boys are influenced more by their parents than by their neighborhoods. I find no evidence of an epidemic model of the spread of social distress, however, using either Crane's (1991) single measure of neighborhood quality, percentage in middle-class occupations, or using several other measures. I also find that both the share of the neighborhood that is disadvantaged and the share that is middle class or better off both affect the likelihood that a boy will drop out of school.

In this analysis, I set out to answer four questions. First, when family characteristics and the monetary returns to education are taken into account, does the neighborhood a boy lives in affect whether he drops out of school? Second, if neighborhoods matter, which neighborhood attributes affect dropping out? Third, are the relationships between the neighborhood variables and the probability of dropping out linear, or are there critical points at which the relationship between the neighborhood characteristic and the likelihood of dropping out changes? Fourth, do individual characteristics modify the relationship between neighborhood characteristics and dropping out?

Correcting for parental factors and the monetary returns to education. In order to evaluate the effects of neighborhoods, we must distinguish the influence of families and monetary benefits of graduation from the influence of neighborhoods. Three major factors complicate this task.

First, neighborhood choice is not exogenous. Parents choose the neighborhoods that their families live in; parents also strongly influence whether their sons will graduate from high school. In this analysis, I develop detailed information about family characteristics in order to isolate the effect of family characteristics as well as possible. To the extent that I have failed to capture family characteristics that are uncorrelated with the included family characteristics, but influence the type of neighborhood the family lives in and whether boys complete high school, my measure of the effect of neighborhood characteristics will include the effect of these unmeasured parental characteristics.

Second, neighborhood characteristics may operate in part through parental characteristics (Brooks-Gunn et al. 1992). For instance, parents in good neighborhoods may have better access to information about and referrals to jobs than parents in bad neighborhoods. In this case, models that include parental characteristics will underestimate the total effect of neighborhood characteristics on dropping out. Unfortunately, the endogeneity of the problem makes it impossible to separate the direct from the indirect effects of neighborhood characteristics.

Third, the apparent relationship between whether a boy drops out and the economic characteristics of the neighborhood he lives in may actually reflect the economic gains associated with graduating from high school. Boys who expect little improvement in their earnings from high school graduation are more likely to drop out (Bickel & Papagiannis 1988; Bickel 1989). Furthermore, if the returns to graduating from high school have been small for a long time, the educational attainment, earnings, and occupational status of the population are likely to be low. To my knowledge, mine is the first research on dropping out that simultaneously considers the

influence of economic incentives and neighborhood characteristics.

Which neighborhood attributes matter? Researchers have yet to determine which neighborhood attributes influence whether boys leave school before graduating. Wilson argues that the presence of stably employed working- and middle-class families in a neighborhood "help[s] keep alive the perception that education is meaningful..." (1987:56). Crane (1991) uses the percentage of workers with professional or managerial jobs as the measure of neighborhood "quality" because it has the greatest effect on the outcome variable of the fifteen variables he tested. However, as he acknowledges, it is not clear why this variable appears to be so important. Brooks-Gunn et al. (1992), using a sample that includes only girls, examine the effects of a number of variables and find three that affect whether girls drop out of school: the percentage of families with children in the census tract headed by a woman, the percentage of families with incomes above $30,000 per year in the zip code area, and a dummy variable indicating whether fewer than 5 percent of male workers in the census tract were in professional or managerial occupations. The model that includes the percentage of families with incomes over $30,000 per year also includes the fraction of families with incomes under $10,000 per year. All other models include only a single neighborhood variable, however, leaving it unclear which (if any) neighborhood variables would have been significant if other neighborhood variables had also been included in the model.

I include two sets of neighborhood measures, one set indicating how "advantaged" a neighborhood is, and the other set describing how "deprived" it is. Work on neighborhood influences has tended to focus on either the proportion of the neighborhood that is engaged in

good behavior or the proportion that is engaged in bad behavior, but not both. Both are probably important, but the use of the "epidemic" as an analogy has obscured this distinction. In a true disease model, only one thing can be caught: the infection. Individuals cannot "catch" health from other uninfected persons. The same is not true of *social* contamination. Individuals are potentially influenced by both good and bad examples. (The influence of people who are good examples may be indirect, through their support of neighborhood institutions and their enforcement of normative behavior; see Wilson 1987.) Clearly, as the proportion of the population in a neighborhood that engages in non-normative behaviors approaches unity, the proportion of the neighborhood providing good examples disappears, and vice versa. At moderate levels of either type of behavior within a neighborhood, however, the level of the other type of behavior can vary.[2]

Nonlinearities in the relationship between neighborhood characteristics and the likelihood of dropping out of school. As noted, Crane (1991) argues that when neighborhood quality is high, susceptibility to social problems is low, that as neighborhood quality declines, the incidence of social problems increases, and that when neighborhood quality drops to a critical level, the incidence of social problems surges.

Crane uses a set of dummy variables--seven for blacks and Hispanics, eight for whites--to estimate the relationship between neighborhood quality and the likelihood of dropping out. Overall, the probability that a teenager drops out of school increases linearly as the percentage of workers in professional or managerial positions declines. However, for blacks and whites,

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[2] Brooks-Gunn et al., working at the same time on a similar project, also argue that both good and bad neighborhood measures should be included.

although not Hispanics, the probability of dropping out increases sharply when the percentage of middle class workers drops below approximately 3.5 percent.

Brooks-Gunn et al. (1992) also test for evidence of an epidemic model. They report that girls who live in neighborhoods where fewer than 5 percent of male workers are managers or administrators are more likely to drop out of school than girls in neighborhoods where 5 percent or more of the male workers are of this class. However, their test of the epidemic model is weaker than Crane's. Using dummy variables, they distinguish among only three categories--less than 5 percent middle class workers, 5 through 10 percent middle class workers, and all others--which makes it difficult to determine whether their findings reflect a real "tipping point" at 5 percent or an underlying linear relationship between their neighborhood measure and the outcome variable.

I differ from both Crane and Brooks-Gunn et al. and code the percentage of workers in middle class occupations--and all other neighborhood measures--as continuous variables. I use splines to test for tipping points, points above or below which the relationship between neighborhood variables and dropping out of school increases or decreases. The use of splines is discussed in the results section.

Do individual characteristics modify the relationship between neighborhood characteristics and dropping out? Whether a good neighborhood helps a boy or a bad neighborhood hurts him is likely to depend on the characteristics of the boy and his family. Poor children in well-off neighborhoods may be alienated from or may be unable to relate to their neighbors. Two parents may be able to shield their children from bad neighborhood influences

better than single parents can. Race and ethnicity may also mediate neighborhood effects (Crane 1991; Brooks-Gunn et al. 1992). In this analysis, I investigate whether a boy's response to neighborhood characteristics is affected by family type and by whether he is black, Hispanic, an immigrant, or comes from a low-income family.

ANALYSIS PLAN

I use logistic regression to examine whether the likelihood that a boy drops out of school before graduating from high school is affected by his personal, family, and neighborhood characteristics and by the increase in earnings associated with receiving a high school diploma. Boys are considered dropouts if they are not currently enrolled in school and have not completed twelfth grade. Boys are considered non-dropouts if they have graduated or are still enrolled.

Two problems are associated with using a cross-sectional data set to study a dynamic process such as dropping out of school.

First, the predictor variables are measured after the process in question has taken place. In order to limit the amount of time between the measurement of the predictor variables and dropping out, I restrict my sample to boys who were in school at the time of the census or had graduated or dropped out within the last year. In an effort to eliminate those who dropped out earlier, I delete young men who were not currently in school, had not graduated, and were two or more years behind the expected grade for their age (see CPS, Series P-20, No. 400, p. 49)[3].

[3] A boy is in the expected grade for his grade if he is in the grade he would be in if he had started first grade at age 6 and advanced exactly one grade per year for every year since then. Thus, 15 year-old boys are expected to be in tenth grade, 16 year-old boys are expected to be in eleventh grade, etc. I made adjustments for boys who had a birthday between the beginning of the school year and April 1, when the census data was collected.

Second, the neighborhood measures available from the census do not necessarily capture the neighborhood characteristics that actually influence boys' behavior. It is likely that a boy is influenced not only by the characteristics of the neighborhood he lives in as a late adolescent, but also by the characteristics of neighborhoods he lived in earlier. I cannot take this into account because the census provides no information about the characteristics of the former neighborhoods of inmigrants or about whether the current neighborhood has itself changed. But it should be noted that if the neighborhood measures available inaccurately measure the "true" neighborhoods that influence boys, the results will be biased *against* finding that neighborhoods influence whether boys drop out of school.

Data and Measures

Individual and Family Characteristics. My data describing teenage boys and their families (Table 1) come from the 5-percent sample of the 1980 Census (U.S. Bureau of the Census, 1983b). Because discussions of neighborhood effects have focused primarily on large urban areas, I limit the sample to states containing the 10 largest SMSAs in 1980. This yields 10 states (California, Illinois, Maryland, Massachusetts, Michigan, New Jersey, New York, Pennsylvania, Texas, Virginia) plus the District of Columbia. In addition to the 10 largest SMSAs, I include all other SMSAs that are wholly contained within these states, for a total of 116 SMSAs.

A total of 143,630 15- to 18-year-old boys live in these SMSAs. To reduce the size of my sample for ease of analysis, I randomly select one fifth of these boys. I further limit the sample to boys who were in school or had dropped out within the last year, were living with a

parent or another adult relative, were not married, and did not have a child living with him. The final sample includes 22,534 young men. (The process of selecting the young men is detailed in Appendix 1.)

As already noted, omitting or mismeasuring family characteristics will tend to inflate the estimates of neighborhood effects on children. Families who live in the same neighborhood often have a great deal in common. Therefore, high drop-out rates may persist in a neighborhood because of types of families who live there, not because of characteristics of the neighborhood itself. There are several reasons why families cannot or will not keep their children in school. Parents may need the earnings that the young man could provide if he worked rather than attended school. If parents are uneducated or immigrants, they may have trouble helping their children navigate through the school system or they may have trouble evaluating the benefits of education (Petrovich & Parsons 1989). If they have been unable to parlay their own educational attainment into sufficient earnings to support their family, they may downgrade the importance of completing high school. If they have not graduated from high school themselves, they may not be able to provide the educational role models that their children need (Arnold 1985). Finally, boys who live only with their mothers may be more likely to drop out, at least in part because single mothers have a particularly difficult time monitoring and controlling their sons' behavior (Astone & McLanahan 1991).

I include extremely detailed information about boys and their families, paralleling as much as possible the variables measured at the neighborhood level. The boys' characteristics are age, race and ethnicity (black, Hispanic, Asian), and nativity (immigrant/nonimmigrant). The family

characteristics are family structure, family income, welfare use, and parental characteristics such as occupation, labor force participation, earnings, whether disabled, educational attainment, and nativity.[4]

In order to represent accurately the family structures of low-income young men, who are more likely both to drop out of high school and to live in nontraditional families, I take a number of steps to ensure that nontraditional families are adequately described. First, I include young men not related to the head of household. No family relationship codes are given for these young men, so I make inferences based on the demographic characteristics of the boys and their putative relatives.[5] Second, I code family types in considerable detail. For instance, in single-parent households, I note whether there is another adult relative present. I also note when boys live with one parent and that parent's partner. Finally, I include boys who do not live with either parent but with an older relative such as a grandparent.[6]

I use family structure to determine which older relative is chosen to supply the "parental" characteristics. For boys living with one parent, that parent's characteristics are used, whether or not another adult relative is present. For boys living with both parents, I use the educational characteristics of the better educated parent and the employment characteristics of the parent who

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[4] If family background variables that affect dropping out are omitted, the estimates of the effects of the family variables that are included may be overestimated (Manski et al 1992). This is not a major limitation of my analysis, however, because the precise effects of parental and family variables on dropping out are not its focus.

[5] A description of this process is available from the author.

[6] The relative has to be a grandparent, aunt, uncle, or other relative--such as a great-aunt or uncle, or great-grandparent--who is at least 15 years older than the young man.

is more strongly attached to the labor force[7]. Similarly, for boys living with an older relative (or relatives) but not a parent, I use the characteristics of the older relative who has achieved the most (i.e., has completed the most years of school or shown the greatest labor force attachment). Educational attainment of parents (or older relatives) is coded in steps rather than in mutually exclusive categories (i.e., all college graduates are also flagged as having completed high school and attended "some college").

Neighborhood Characteristics. The variables I use to describe neighborhoods (Table 2) come from the Urban Institute's Underclass Data Base (UDB), a file containing detailed information about 1970 and 1980 census tracts (Wiener 1989; Wiener et al. 1992). Tract-level data from the UDB are linked to the individual boys' records that identified tract of residence, provided through a special arrangement with the Census Bureau.

Measures of neighborhood advantage include the percentage of persons aged 16 and older who work in professional or technical occupations or as managers or administrators, the percentage of families with incomes over $40,000 per year, and the percentage of adults aged 25 and older who have completed college.[8] Measures of neighborhood distress include the male employment rate, the percentage of adults aged 25 or older who have not graduated from high

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[7] The range from most attached to least attached to the labor force is as follows: with a job and at work; with a job but not at work, unemployed, not in the labor force.

[8] The "middle class" measures may actually reflect how *upper* middle class a neighborhood is. In preliminary analysis, I experimented with using lower family income cutoffs, but found that using $40,000 per year was more significant. Furthermore, the percentage of neighborhood adults in clerical and kindred occupations and in craft occupations were not significantly related to whether teenage boys stayed in school.

school, the percentage of families with children headed by women, the percentage of families receiving welfare, and the percentage of people below the poverty line.

Labor Market Characteristics. Data used to describe labor market conditions (Table 3) are derived using the full 5-percent sample of the 1980 Census (U.S. Bureau of the Census, 1983b). The major labor market variable is *returns to education.* The value of each boy's "returns to education" variable depends on the SMSA he lives in and his racial/ethnic group. The three mutually exclusive racial/ethnic groups are black, nonblack-Hispanic, and nonblack-nonHispanic (hereafter referred to as "Anglos and others"). For each group within every SMSA, I calculate the mean earnings for men who have not completed high school and for those who have using cell entries from a 696-cell tabulation of mean earnings of men aged 21-29 by racial/ethnic group, SMSA, and high school graduation status (3 racial/ethnic groups x 116 SMSAs x 2 educational groups). The total sample size for this tabulation is 337,854. In order to ensure reliable estimates, I discard means calculated from cells containing fewer than 20 men; this required dropping 338 from the sample (see Appendix 1).

Boys are tagged as living in a "high returns" area if the economic returns to education are above the median for the sample and as living in a "low returns" area otherwise. The economic returns to education are coded as:

$$EARN_g/EARN_d$$

where EARN is mean earnings in the SMSA for the boy's own racial/ethnic group, d is dropout, and g is graduate.[9]

By including a variable reflecting returns to graduation, the model is consistent with rational choice formulations of schooling decisions. According to this model, boys compare the future economic benefits of two alternatives facing them--to stay in high school or to drop out--and decide between the two according to their relative benefits. Analogous approaches have been used to analyze several binary choices, such as teenage childbearing (Duncan & Hoffman 1990; Lundberg & Plotnik 1990). The returns to high school graduation variable reflects the "expected path utility" concept of Manski (1988), in which the utilities attached to alternatives are evaluated using observations of peer or reference group outcomes (see also Wolf et al. 1990). Unfortunately, even the large data file does not make it possible to use a more geographically disaggregated definition of reference groups than the SMSA.

I also include a measure of the educational composition of men in the SMSA. This is the percentage of men aged 21-29 for each racial/ethnic group within each SMSA who have not graduated from high school. This variable reflects, for each racial/ethnic group, the forces pushing young men out of high school that are not captured by the returns to school variable or other factors explicitly taken into account in this analysis.[10]

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[9] Exploratory analysis, using a number of different specifications, showed that when the variable was coded linearly, it did not appear to affect school leaving. Furthermore, when the returns variable was coded with more categories (e.g., in quartiles), only comparisons above and below the median were significant.

[10] I thank Frank Levy for suggesting this measure.

Steps to Reduce Selection Bias. Selection bias is a potential problem if the probability that a boy is included in the sample is affected by whether he is a dropout, what type of neighborhood he lives in, and other characteristics included in the analysis. Boys are obviously excluded if they are missed by the census, as were 0.3 percent of 15- to 19-year-old black males and 0.1 percent of 15- to 19-year-old nonblack males (Fay et al. 1988:28, Table 3.4). The exclusion of boys who do not live with their families is potentially a greater problem. The dropout rate for boys who live in a family is considerably lower than the rate for boys who do not. To reduce this type of bias, as noted, I expand the concept of "family" to include boys living with *any* adult relative, not just a parent; only 4.4 percent of boys are thus excluded for not living in a family. Note that if boys who are both dropouts and from "bad" neighborhoods are underrepresented in the sample (because the probability that they live with their families is especially low), then the results of this analysis will be biased *against* finding that neighborhood attributes affect whether a boy drops out.

RESULTS

1. Individual, Family, and Labor Market Characteristics.

The results of the model showing the effects of individual, family, and labor market characteristics on the likelihood that young men drop out are presented in Table 4. For categorical variables, the coefficients represent the effect of being in a given category compared with being in the omitted category (shown in parentheses). Several results merit comment.

Blacks, overall, are more likely to drop out of school than whites or Asians (as shown in Table 1). But when family characteristics are taken into account, blacks are significantly less

likely to drop out than nonblacks. The higher drop-out rates for blacks can be attributed to the fact that blacks are less likely to live with both parents and more likely to have parents with low educational attainment and low occupational status. Given their family characteristics, blacks do better than other groups.

Hispanics, overall, are more likely to drop out than non-Hispanics. This difference is maintained even when detailed family characteristics are taken into account. However, when the SMSA-level variables are introduced, Hispanics appear to be less likely than non-Hispanics to drop out of school. The SMSA variable responsible for this change is the drop-out rate for 21- to 29-year-old men of the same ethnic group as the boy in question. Hispanic men in their twenties are considerably more likely than either blacks or whites to have left high school without graduating.[11] Given the high drop-out rates of Hispanic men just a few years older than they are, Hispanic teenagers are less likely to drop out than non-Hispanics.

Boys who are immigrants, or who have an immigrant parent, are less likely to drop out than boys with native parents. This suggests that the relatively high overall drop-out rate for boys who are immigrants is the result of other characteristics (such as family structure and lower parental educational attainment and occupational status) rather than immigrant status *per se*.

Several parental characteristics have a significant impact on whether boys drop out of school. Boys who live with both parents are substantially less likely to drop out than boys who

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[11] High school completion among Hispanic men in their twenties may be low because a significant proportion of them are immigrants. However, there were too few Hispanics in the sample of 21- to 29-year-old men to distinguish between immigrants and nonimmigrants.

live with only one parent or with another older relative.[12] Every educational milestone that a parent has passed--high school graduation, entering college, and college graduation--reduces the likelihood that his (or her) child will drop out of school. Boys whose parents are managers or professionals are less likely to drop out than boys whose parents have lower status jobs.

I also examine the influence of parental work status, disability, and receipt of welfare on whether boys drop out of school, testing for interactions among these variables. Among boys whose parents currently work, those whose parents received welfare payments in the last year are more likely to drop out of school than boys whose parents received no assistance. Boys with a disabled parent are somewhat less likely to have dropped out than working parents who did not receive welfare. Boys whose parents do not work are more likely to drop out than boys with working parents not receiving welfare.[13] Nonwelfare family income, under a number of different specifications, does not significantly affect whether boys drop out, even when parental educational and occupational status are omitted (not shown).

2. *Neighborhood Characteristics*

I examine the effects of eight neighborhood variables: the percentage of adults in middle-class occupations, the percentage of families with annual income over $40,000, the percentage

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[12] Among boys who do not live with both parents, living with a single parent compared with living with another older relative has no effect. Among boys who live with a single parent, neither the sex of the parent nor living with either another adult relative or with the single parent's partner makes a difference.

[13] Additional analysis showed that, among families with a work-disabled parent, the receipt of welfare payments did not affect whether boys were in school. Furthermore, among boys whose parents did not work, the likelihood that a boy was in school was not affected by whether the parent was looking for work or by family receipt of welfare.

of adults who have graduated from college, the male employment rate, the percentage of adults who have not completed high school, the percentage of families with children headed by women, the percentage of the population receiving welfare, and the poverty rate. In equations including a single neighborhood variable plus individual, family, and SMSA-level variables, each of the neighborhood variables is highly significant (Table 5).

Compared to a model that includes only the individual, family, and SMSA-level variables, the addition of the three "middle class" neighborhood variables (percentage in middle-class occupations, percentage with incomes over $40,000, and percentage college graduates) significantly increases the fit of the model (Table 6, Column 1). Both the percentage with incomes over $40,000 and the percent in middle-class occupations are significant and in the expected direction. The percentage college graduates is highly correlated with both the percentage in middle-class occupations and the percentage with incomes over $40,000, especially the former (the first-order correlations are 0.95 and 0.79, $p<0.0001$ for both, see Table 7), and in most specifications is not significant. It is included in the equation to reduce the bias in the estimates of the other two variables.

When the three middle class indicators are included, only three measures of neighborhood distress are significant: the female headship rate, the welfare use rate, and the poverty rate (see Table 6, Columns 2-6). The likelihood that a boy drops out increases as the level of distress in his neighborhood increases. Models that include any one of these three neighborhood distress indicators fit the data better than models that include only the middle class indicators. However, because these three measures are highly correlated with one another, none is significant if either

of the others is included (see Table 7 and Table 6, Columns 7-9). I choose the poverty rate as the indicator of neighborhood distress because the parameter estimate for the poverty variable is the most stable under different specifications and its addition to the model improves the fit slightly more than the addition of either of the other two variables.

The percentage of the neighborhood that is black or Hispanic does not significantly affect whether boys drop out (see Table 8).

The full model, including the effects of individual, family, SMSA, and neighborhood characteristics is shown in Table 9. Although the characteristics of the neighborhoods boys live in affect whether they stay in school or drop out, it is still clear that boys are influenced more by their parents than by their neighbors. For example, boys who live with both parents are about 80 percent less likely to have dropped out than boys who live with one parent or with some other relative. To get the same improvement in the odds that a boy is still in school, the share of the neighborhood in middle-class occupations would have to increase by 31 percentage points, the share of families in the neighborhood with high incomes would have to increase by 23 percentage points, or the poverty rate would have to decline by 68 percentage points.

3. Tipping Points

In the models presented so far, the relationship between the neighborhood variables and the likelihood of dropping out is assumed to remain constant. All else being equal, each percentage point change in a neighborhood variable changes the odds that a boy drops out by the same amount. It is possible, however, that there are "tipping points"--points above or below which the relationships between the neighborhood variables and dropping out of school are

attenuated or magnified, and that these tipping points may be at the low end (where neighborhoods are very bad) or at the high end (where neighborhoods are very good).

Four scenarios are possible. First, neighborhoods may reach a point at which disorganization is so great that the likelihood that boys drop out of school soars dramatically, as suggested by Crane (1991) and Wilson (1987). Second, there may be some point at which a neighborhood is so poor and disorganized that additional disorganization does not greatly change the likelihood that a boy will drop out. Third, there may be some point at which a neighborhood becomes so well-off that the additional benefit for the boys who live there get larger. Fourth, there may be some point at which the neighborhood is so well off that additional improvement has little effect on the boys who live there.

I test for tipping points using a function composed of piece-wise linear parts (splines), which are calculated as follows:

For **X** < **t**, **S**=0,

for **X** >= **t**, **S**=**X**-**t**,

where **X** is an independent variable (the share in middle-class occupations, the share with incomes over $40,000, and the poverty rate), **t** is the tipping point (10 percent, 20 percent, etc.), and **S** is the spline variable. For values of **X** below **t**, the relationship between **X** and dropping out is described by the parameter estimate associated with **X**. For values of **X** at or above **t**, the relationship between **X** and dropping out is described by the sum of the parameter estimates associated with **X** and with **S**.

For each of the three significant neighborhood variables, I test for tipping points at 10 percent intervals (e.g., where the percentage in middle-class occupations is 10 percent, 20 percent, 30 percent, etc.). Nearly two-thirds of all boys live in neighborhoods with poverty rates of less than 10 percent and over half of all boys live in neighborhoods in which fewer than 10 percent of families have incomes over $40,000 per year. For this reason, I also test for tipping points at 1 percent, 2.5 percent, and 5 percent for these two variables. Because Crane (1991) finds that the probability that a teenager drops out increases sharply when the share that is in middle-class occupations falls below approximately 3.5 percent, I also test for tipping points at 3.5 percent and 5 percent.

For both the poverty rate and the percentage in middle-class occupations, I find a single significant tipping point. I find no significant tipping point for the percentage with incomes over $40,000. To simplify the presentation (Table 10, Panel A), I recode the spline for the poverty rate. When the poverty rate is less than or equal to 5 percent, the poverty spline equals the poverty rate minus 5 and when the poverty rate is above 5 percent, the poverty spline equals 0.

Table 10, Panel B, shows the change in the odds of dropping out associated with a 5 percentage point increase in the neighborhood variables. In order to evaluate these results, it is necessary to examine both the point estimates and the 95 percent confidence intervals for the odds ratios. An odds ratio above 1 indicates that if the neighborhood measure increases, the likelihood that a boy will drop out increases. An odds ratio below 1 indicates that if the neighborhood measure increases, the likelihood that a boy will drop out decreases. When the 95

percent confidence interval for a neighborhood variable's odds ratio includes 1, the neighborhood variable does not significantly affect whether boys drop out.

As the share of the neighborhood in middle-class occupations increases, the overall likelihood that a boy will drop out decreases. When at least 50 percent of the adults are in middle-class occupations, however, there is no added positive effect associated with further increases in the share in middle-class occupations.

As the poverty rate increases, the overall likelihood that a boy drops out increases. However, the sharpest increases in the likelihood that a boy drops out of school occur as neighborhood poverty rates climb from 0 to 5 percent. Over this interval, the odds of a boy dropping out increase by about 90 percent. Further increases in the poverty rate have relatively small effects. As the poverty rate increases from 5 to 10 percent, for example, the odds that a boy will drop out increase by less than 4 percent.

i. Interactions Between Individual Characteristics and Neighborhood Characteristics.

The results presented so far assume that all boys respond in the same way to the characteristics of their neighborhoods. In this section, I investigate the extent to which a boy's individual and family characteristics mediate his response to neighborhood characteristics. (A detailed description can be found in Appendix 2.)

Blacks, Hispanics, and boys from low-income families respond differently to neighborhood factors than other boys (Table 11). I consider boys low-income if their families had annual incomes of less than $10,000 for 1979 from all sources except welfare. The

interactions between the neighborhood variables and immigrant status and family status are not significant.

Table 11, Panel B shows the effects on the odds of dropping out of a 10 percentage point change in the neighborhood variables. Here again the point estimates and 95 percent confidence intervals are necessary for interpretation. For blacks, increases in the share of high-income families do not significantly affect whether boys drop out of school. Furthermore, the overall positive relationship between dropping out and the neighborhood poverty rate does not apply for Hispanics. Finally, the overall negative relationship between the share of the neighborhood that is in middle-class occupations and the likelihood of dropping out does not apply to low-income boys.

These interactions should not be interpreted to mean that boys who are black or poor derive no benefit from living in middle-class neighborhoods or that Hispanic boys are not harmed by living in poor neighborhoods. The coefficient for each of the neighborhood variables reflect the effects of that variable on dropping out *net* of the effects of the other neighborhood variables. This means that despite the positive interaction between being black and the neighborhood high income variable, black teenagers in neighborhoods with a large share of families are still probably less likely to drop out than black teenagers in neighborhoods with smaller shares of high-income families. This is because neighborhoods with large shares of high-income families also tend to have large shares of adults in middle-class occupations and small shares of people below the poverty line.

The extent to which boys respond to the characteristics of their neighborhoods may depend on the racial or ethnic composition of the neighborhood. Although my results show that neighborhood racial and ethnic composition do not affect whether boys drop out of school (see Table 8), it is still possible that teenagers are more affected by their neighbors' actions and accomplishments if most of their neighbors are of the same racial or ethnic group than if most of their neighbors are from a different group.

I find no evidence that the ethnic or racial composition of a neighborhood mediates young men's responses to neighborhood characteristics (Table 12). If blacks responded to the share of families that are high income only when they live in predominantly black neighborhoods, then the three-way interaction among being black, the percentage high income, and living in a predominantly black neighborhood should be positive and large enough to offset the negative impact of the interaction between being black and the percentage high income. Instead, the three-way interaction is negative and is not significant. Similarly, if Hispanics respond to the poverty rate in their neighborhoods only when they live in Hispanic neighborhoods, then the three-way interaction between being Hispanic, the poverty rate, and living in a predominantly Hispanic neighborhood should be significant and negative. However, while the sign for the three-way interaction term is negative, the coefficient is not significant.

To examine the possibility that the interactions between being poor, black or Hispanic and the neighborhood variables actually reflect the fact that boys who are poor, black, or Hispanic tend to live in relatively poor neighborhoods, I also include both the spline variables and the individual-neighborhood interactions (Table 13). The Hispanic-poverty rate interaction, the low

income-middle-class occupation interaction, and the middle-class occupation spline remain significant. The significance levels for the poverty spline and the black-high income interaction decline, but still approach significance ($p<0.0787$ and $p<0.0794$, respectively).

COMPARISONS WITH OTHER STUDIES

My findings are similar to those of Brooks-Gunn et al. (1992), although their analysis differs from mine in a number of ways. They use the Panel Study of Income Dynamics, for some measures use Zip Code areas to define neighborhoods, and include only females in their sample. Despite these differences, they also find that blacks appear to benefit less than nonblacks from living in high income neighborhoods. They find no significant interaction between being from a low-income family and variables describing neighborhood income, although income is measured at the zip code area level rather than the census tract level. They do not test for interactions between being from a low-income family and the percentage of the neighborhood in middle-class occupations.

My results, as noted, differ substantially from Crane's (1991). Crane's theory predicts that the likelihood that a boy will drop out of school increases sharply when the percentage of the population that is in middle-class occupations or with high income is low or when poverty rates are high. In contrast, I find no dramatic increase in dropping out among boys who live in neighborhoods with very few families with high incomes or very few adults in middle-class occupations. The greatest changes in the likelihood that boys drop out of school are in neighborhoods with poverty rates below five percent, not in neighborhoods with very high

poverty rates. Increases in the likelihood that boys will drop out of school associated with increases in the poverty rate above 5 percent are relatively small.

The differences in our findings are not explained by differences in our methods of coding neighborhood quality or differences in our samples.

I recode percentage in middle class occupations into eight intervals. Because Crane finds the likelihood of dropping out of school increases sharply for blacks and whites when the percentage middle-class occupations falls below approximately 3.5 percent, my bottom interval is 0 to 3.5 percent. The other intervals are 3.51 to 4.99 percent, 5.00-9.99 percent, 10.00 to 19.99 percent, 20.00 to 29.00 percent, and so on. The highest interval, 50 percent and higher, is the omitted (or reference) category.

Using this method of coding percentage in middle class occupations, I estimate two models. The first (Table 14) uses all variables included in my basic model (see Table 9) except the other neighborhood variables. When the other neighborhood variables, coded continuously, are included in the model, the interval-coded middle-class occupations variables are not significant.

The second model (Table 15) excludes the SMSA-level variables because Crane's model does not include these variables and is estimated using a sample that is similar to Crane's. Following Crane, I exclude boys who do not live with at least one parent. Because Crane found no sharp increase in dropping out for Hispanics when the percentage middle class is low, I exclude Hispanics. Crane estimates separate equations for blacks and whites. My sample is not large enough to estimate separate equations: The combined sample includes 19,670 boys, but

only 38 are in neighborhoods where 3.5 percent or fewer adults are in middle-class occupations. It should still be possible to detect a low-end tipping point with the combined sample because Crane reports the critical point in neighborhood quality is nearly identical for both groups, 3.5 percent for blacks and 3.6 percent for whites.[14] Crane reports sharp increases in dropping out associated with a low percentage middle class for both males and females, so my exclusion of females should not affect results.

I use two methods to test for whether boys living in neighborhoods with very few adults in middle-class occupations are significantly more likely to stay in school than boys in better-off neighborhoods. First, to test whether the likelihood of dropping out for boys in one interval differs significantly from the likelihood for boys in the next highest interval, I used step-coding, rather than discrete-interval coding, to code the percentage middle class.[15]

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[14] The boundaries of my intervals differ somewhat from Crane's because he uses percentile scores to determine boundaries:

> For example, the bottom group includes the 5% of the black population living in the worst neighborhoods. In ascending order, the intervals are percentiles 0-5, 6-10, 11-25, 26-50, 51-75, 76-90, and 91-100. The sample intervals are used for whites. But an eighth is added, 0-.1, for the purpose of comparison, in the same range of the bottom interval for blacks" (Crane 1991: 1233).

Crane reports that the relationship between percentage middle class and the likelihood of dropping out is essentially linear when the percentage middle class is above 3.5 percent for blacks and 3.6 percent for whites, so differences in interval boundaries should not affect results.

[15] For example, there is a dummy variable with a value of 1 for *all* boys who live in neighborhoods with fewer than 50 percent in middle class occupations, another dummy variable with a value 1 for *all* boys who live in neighborhoods with fewer than 40 percent in middle class occupations, and so on.

Second, following Crane, I extrapolate the likelihood of dropping out for boys in the two lowest intervals from the observed relationship between dropping out and percentage middle class for boys in neighborhoods with the percentage middle class between 10 and 49.99 percent. I do this by using OLS to fit a line through the estimated logistic regression coefficients for each interval between 10-19.99 and 40-49.99. (The mean percentage middle class in each interval is the independent variable.) I then use the estimated OLS coefficients to calculate the expected logistic regression coefficients for the bottom two intervals.

For both my original sample and the sample modified to approximate Crane's, I find no evidence of a sharp increase in the likelihood that boys drop out of high school when the percentage middle class is 3.5 percent or lower. In neither case was the coefficient for the 0-3.5 percent interval significantly higher than the coefficient for the 3.51-4.99 percent interval. Furthermore, in both cases I find the observed odds of dropping out for boys in the bottom two intervals are *lower* than the odds of dropping out predicted by fitting a line through the logistic regression coefficients for intervals 5-9.99 percent through 40-49.99 percent (Table 14, Columns 5 and 6, and Figure 1; Table 15, Columns 5 and 6, and Figure 2). (Note that my earlier finding, that increases in the percentage in middle class occupations beyond 50 percent do not translate into further declines in the likelihood of dropping out, is replicated when percent middle class is coded in intervals.)

Another possible explanation for the difference between my findings and Crane's is that a small percentage in middle class occupations may have been a better measure of neighborhood distress in 1970 than in 1980. It could be argued that, compared to 1970, in 1980 neighborhoods

with 3.5 percent or fewer adults in middle class occupations were better off on other dimensions. Similarly, compared to 1970, in 1980 neighborhoods with more than 3.5 percent or more adults in middle class occupations may be worse off on other dimensions. However, my failure to find sharp increases in dropping out when I use other measures of neighborhood distress--high levels of poverty and low percentage of families with high income--suggests that this is unlikely to be the explanation.

Finally, my failure to replicate Crane's findings may reflect differences in our definitions of neighborhood--Crane uses census block groups while I use census tracts. Unfortunately, it would be difficult to resolve this issue. No equivalent to census block groups was created for the 1980 census and there is no 1970 census file that is equivalent to the file I used, a subsample of the 1980 census including detailed geographic identifiers.

CONCLUSIONS

My analysis indicates that whether a boy drops out of school depends not only on his family background and the increase in earnings he can expect if he receives a high school diploma but also on the characteristics of the neighborhood he lives in. Specifically, the greater the number of neighbors who are middle class or even better off--and the fewer neighbors who are poor--the less likely it is that a boy will drop out of school.

My results also suggest that neighborhood "quality" has both good and bad dimensions that influence drop-out rates. The share of the population that is disadvantaged--as measured by the poverty rate in this analysis--and the share of the population that is middle-class--as measured

by the proportion of the population with incomes over $40,000 and the proportion in middle-class occupations--both affect the likelihood that a boy will drop out of school.

Although I find no evidence of a sharp increase dropping out in severely disadvantaged neighborhoods, I do find that the relationship between some neighborhood variables and the likelihood of dropping out deviate from linearity. Increases in the share of the population with high income lower the likelihood that a boy will drop out, but only up to a point. Once the percentage of the population with high income reaches about 50 percent, further gains in the size of the high income population do not affect the odds that a boy will drop out.

Further, neighborhoods containing even a few poor people are substantially different from neighborhoods with no poor people. The odds of a boy dropping out of school increase sharply as neighborhood poverty rates increase from 0 to 5 percent; additional increases in the poverty rates have a relatively small impact. For example, according to the results presented here, the odds that a boy from a neighborhood with a one percent poverty rate has dropped out are 14 percent higher than the odds for a boy from a neighborhood with no poor people. In contrast, the odds that a boy from a neighborhood with a 6 percent poverty rate has dropped out are only 0.7 percent higher than the odds for a boy from a neighborhood with a 5 percent poverty rate.

A boy's individual characteristics also affect how he is influenced by the neighborhood he lives in. The negative relationship between the share of the neighborhood that is middle class and the likelihood that a boy drops out is weaker for boys who are black or poor. Furthermore, for boys who are Hispanic, the percentage poor has no effect on whether they drop out.

I find no evidence that teenagers are influenced more by the actions and examples of those who are like them than those who are not. My data are not very well suited to examine this issue because I have no data on the socioeconomic characteristics of Hispanics and blacks *within* each neighborhood. This means, for example, that I cannot distinguish a neighborhood with a large black middle-class population from a predominantly black neighborhood in which all the nonblacks--but only a small share of the blacks--are middle class.

While my findings strongly suggest that the type of neighborhoods boys live in affect whether they drop out, this type of analysis cannot tell us exactly *how* neighborhood milieu influences teenagers' behavior. Boys may be influenced by the behavior of adults in their neighborhoods--as role models, as enforcers of normative behavior, and as supporters of community organizations. But, as Jencks and Mayer (1990) point out, adults who are good role models probably raise children who are good peer influences, and work to ensure that local schools are of high quality.

The ability to determine *which* neighborhood characteristics affect dropping out is limited by two factors. First, only a limited number of variables are available to describe census tracts. Second, neighborhood measures are often highly correlated with each other. Even my large data set does not make it possible to identify exactly which characteristics affect whether boys drop out of school. I use the poverty rate as the measure of neighborhood distress, but this variable is very highly correlated with both the share of families with children headed by women and the share of families receiving welfare, making it impossible to pinpoint how each of these factors affects the outcome variable.

APPENDIX 1

Selecting the Sample

The original sample contains 143,630 young men between the ages of 15 and 18, inclusive. When there is more than one boy in a household who falls in this age range, I randomly select one boy to stay in the sample (yielding 123,686). I select a random sample of 20 percent of these boys (yielding 24,739). I further to limit the sample to boys who appeared to have dropped out of school more than a year ago (yielding 23,927). Thirty-four boys come from census tracts that are not included in the UDB or contain unusable data; 1021 boys do not live with a parent or older relative, have been married, or have a child[16]. These boys are dropped (yielding 22,872). Of those left, 338 live in SMSAs from which I could not obtain usable data. This represents about 5 percent of the blacks of the sample, 3 percent of the Hispanics, and less than 0.5 percent of whites and others. The final sample includes 22,534 young men. Data are self-weighting.

[16] This is measured imperfectly because we only know if men have children if the children live in the same household.

Appendix 2

Interactions Between Individual and Neighborhood Characteristics

I test a total of 15 interaction terms (5 personal characteristics x 3 neighborhood variables). The process of determining which interactions takes the following steps. First, I include each of the 15 interactions one at a time (Appendix Table 1). Second, I simultaneously include all interaction terms that are significant in the first step, retaining only those that are significant (Appendix Table 2). Finally, I include, one at a time, all remaining interaction terms, retaining only those that are significant. The final equation is shown in Appendix Table 3. The interactions between the neighborhood variables and boys immigrant status and family type are not significant. However, blacks, Hispanics, and boys from low-income families appear to respond differently to the characteristics of their neighborhoods than other boys.

I also examine whether blacks, Hispanics, and the poor respond differently to family attributes than other boys. I check for interactions between being black, Hispanic, or poor with all other independent variables. The significant interactions are shown in Appendix Table 3. For boys who are either poor or black, the negative consequences of living with only one parent (or only a nonparent) are less than they are for other boys. The positive relationship between age and the probability of dropping out of school is weaker for Hispanics than non-Hispanics. The relationship between parents' education and the likelihood of dropping out is also somewhat different for blacks than nonblacks. For nonblacks, the offspring of parents with low-status jobs are, in general, more likely to drop out than the offspring of parents who are professionals or

managers. For blacks, the offspring of operators and nonfarm laborers are no more likely to drop out than the offspring of managers and professionals.

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Table 1. Individual and Family Characteristics.		
N=22,534	% of Sample	% Who Have Dropped Out
Total	100	5.3
Age		
15	26.6	1.83
16	26.8	4.43
17	26.3	7.43
18	20.3	8.40
Race/ethnicity		
White/other	81.4	5.14
Black	16.0	6.65
Asian	2.6	3.22
Hispanic (any race)	12.4	8.23
Immigration status		
Boy is immigrant	6.6	5.82
At least one parent is immigrant	9.7	4.82
Family Type		
Both parents (includes stepparents)	73.9	4.01
Other family type	26.1[a]	9.08
Parent's educational attainment		
Not high school graduate	22.1	10.42
High school graduate	36.2	5.45
Some college	19.4	3.67
College graduate	22.4	1.57
Parent's occupational attainment		
Managerial or professional	25.8	2.22
Sales	8.3	4.03
Administrative support	11.0	5.34
Technicians	2.6	5.04
Precision production workers	16.6	5.20
Machine operators, etc.	13.6	6.96
Nonfarm laborers	3.5	8.25
Service workers	10.5	8.35
Other occupations	1.6	5.32
No occupation	6.7	9.78

[a] 2.7 percent of sample members live with an older relative other than a parent.

Table 1 (continued).

	% of Sample	% Who Have Dropped Out
Employment status, disability, welfare use, and income		
No working parent	7.0	10.17
Disabled parent	4.7	7.89
Family receives welfare	11.3	9.27
Parent works and receives welfare	3.1	8.40
Low-income (Family income < $10,000)	14.8	9.41
Mean family non-welfare income: $29,216		

Table 2. Characteristics of the Neighborhoods Teenage Boys Live in - Overall and for Teenage Boys in each Ethnic/Racial Group. Means and Standard Deviations (in parentheses)

	Overall	Anglo /Other	Black	Hispanic
% Middle class occupations	27.0 (13.2)	30.2 (12.6)	18.4 (10.4)	19.1 (11.4)
% Over $40,000	12.4 (12.3)	15.0 (13.0)	5.5 (6.5)	6.4 (7.8)
% College graduates	18.1 (13.9)	21.1 (14.1)	9.9 (9.7)	11.3 (10.5)
% Males 16+ employed	72.1 (11.5)	75.4 (8.6)	59.6 (13.9)	69.1 (10.8)
% Dropouts, 25 and older	31.2 (17.8)	25.7 (14.2)	44.3 (15.9)	46.1 (21.1)
% Female-headed households	19.3 (15.1)	14.0 (8.9)	40.7 (18.5)	22.5 (13.7)
% Welfare	9.2 (10.2)	5.6 (5.1)	21.5 (14.5)	14.3 (11.0)
% Poverty	11.3 (11.7)	7.0 (6.1)	24.6 (15.1)	19.7 (13.7)

Table 3. Labor Market Conditions.

Characteristics for Men Aged 21-29: Means for SMSAs. (Number in parentheses is number of SMSAs used in calculation.)[a]

		Monetary returns for completing high school.			
	Percent dropouts	Mean earnings		Absolute difference	Percent difference
		Dropouts	Graduates		
Anglo/other	11.5% (116)	$8,303 (109)	$11,171 (116)	$2,926 (109)	37.6 (109)
Black	22.8% (116)	$5,703 (50)	$8,129 (83)	$3,056 (50)	69.5 (50)
Hispanic	33.5% (116)	$7,278 (52)	$9,401 (116)	$2,298 (109)	33.3 (109)

[a] SMSAs with fewer than 30 men in category were not used to calculate means.

Table 4. The Effects of Individual, Family, and SMSA-level Variables on the Likelihood that Young Men Drop Out of School.

Variable	*Estimated coefficients*		*Odds ratio*
	(1)	*(2)*	*(2)*
Intercept	-11.10	-11.31	
Age	0.49*	0.49*	1.63
(White)			
Asian	-0.32	-0.32	0.73
Black	-0.22*	-0.41*	0.66
Hispanic	0.20*	-0.42*	0.66
Boy is immigrant	-0.32*	-0.33*	0.72
Not with both parents	0.62*	0.61*	1.84
Family Variables:			
(High school dropout)			
High school graduate	-0.54*	-0.53*	0.59
Some college	-0.29*	-0.30*	0.74
College graduate	-0.62*	-0.63*	0.53
(Manager or professional)			
Sales worker	0.22	0.22	1.25
Administrative support	0.26	0.26	1.30
Other occupation, n.e.c.	0.05	0.04	1.04
No occupation	0.37*	0.38*	1.46
Technician	0.52*	0.52*	1.68
Precision production	0.42*	0.42*	1.52
Machine operators, etc.	0.50*	0.48*	1.62
Nonfarm laborer	0.64*	0.64*	1.90
Service worker	0.62*	0.63*	1.88
(Works, receives no welfare)			
Works, receives welfare	0.28*	0.26*	1.30
Disabled	-0.04	-0.03	0.97
Does not work	0.24*	0.25*	1.28
Income (logged)	0.01	0.01	1.01
Parent is immigrant	-0.23*	-0.23*	0.79
SMSA-level variables:			
% Dropout in ethnic group		0.0213*	1.022
Returns to graduating		-0.21*	1.24

* $p<0.05$.
Chi-square for covariates (Equation 1): 885.536 (df=25, $p<0.0001$)
$-2L.L._{(Equation\ 1)}-2\ L.L._{(Equation\ 2)}$: 19.703 (df=2, $p<0.001$)

Table 5. Effects of Each Neighborhood Variable on Dropping Out. Each row represents a separate equation.

Variable	*Estimated coefficient*
% Middle class occupations	-0.0233
% Over $40,000	-0.0359
% College graduates	-0.0204
% Males 16+ employed	-0.0124
% Dropouts, 25 and over	0.0126
% Female-headed households	0.0137
% Welfare	0.0190
% Poverty	0.0188
All coefficients significant at $p < 0.0001$.	

Note: The following variables are also included in the equations: Age, race, ethnicity, immigration status; parent's educational attainment, occupational status, work/welfare/disability status, and immigration status; and SMSA-level variables.

Table 6. Effects of Combinations of Neighborhood Characteristics on Whether Boys Drop Out of School.
Each column represents a separate equation.

Variable	*Estimated coefficients*								
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
% Middle class occupations	-0.0244*	-0.0243*	-0.0234*	-0.0227*	-0.0213*	-0.0191*	-0.0215*	-0.0202*	-0.0199*
% Over $40,000	-0.0305*	-0.0298*	-0.03.02*	-0.0265*	-0.0289*	-0.0259*	-0.0274*	-0.0260*	-0.0272*
% College graduates	0.0177*	0.0182*	0.0180*	0.0160	0.0174*	0.0136*	0.0166*	0.0150	0.0156
% Males 16+ employed		-0.0021							
% Dropouts, 25 and older			0.0012						
% Female-headed households				0.0058*			0.0030	0.0025	
% Welfare					0.0086*		0.0055		0.0031
% Poverty						0.0087*		0.0063	0.0062

* $p<0.05$

$-2L.L._{(Equation\ 1)}$ compared with equation with no neighborhood variables: 351.077 (d.f.=3, $p<0.001$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 4)}$: 4.626 (d.f.=1, $p<0.05$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 5)}$: 5.021 (d.f.=1, $p<0.05$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 6)}$: 5.990 (d.f.=1, $p<0.02$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 7)}$: 5.587 (d.f.=2, $p<0.10$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 8)}$: 6.476 (d.f.=2, $p<0.05$)

$-2L.L._{(Equation\ 1)} - -2L.L._{(Equation\ 9)}$: 6.234 (d.f.=2, $p<0.05$)

Note: The following variables are also included in the equations: Age, race, ethnicity, immigration status; parent's educational attainment, occupational status, work/welfare/disability status, and immigration status; and SMSA-level variables.

Table 7. Neighborhood Characteristics - Correlation Matrix

	% Over $40,000	% College graduates	% Males 16+ employed	% Drop-outs, 25 and older	% Female-headed households	% Welfare	% Poverty
% Middle class occupations	0.77939	0.94931	0.51709	-0.83127	-0.46357	-0.57295	-0.56384
% Over $40,000		0.79364	0.48195	-0.66902	-0.49382	-0.47818	-0.51699
% College graduates			0.51065	-0.79338	-0.41915	-0.52522	-0.49414
% Males 16+ employed				-0.69604	-0.71956	-0.79976	-0.75860
% Dropouts, 25 and older					0.56768	0.70762	0.75102
%Female-headed households						0.84523	0.82533
% Welfare							0.89840

All correlations significant at $p<0.0001$.

Table 8. Effects of Neighborhood Racial and Ethnic Composition on Dropping Out of School. Each column represents a separate equation.		
Variable	*Estimated coefficients*	
	(1)	*(2)*
% Middle class occupations		-0.0178*
% Over $40,000		-0.0274*
% College graduates		0.0143
% Poverty		0.0057
% Black	0.0065*	0.0023
% Hispanic	0.0089*	0.0027
* $p<0.05$		

Note: The following variables are also included in the equations: Age, race, ethnicity, immigration status; parent's educational attainment, occupational status, work/welfare/disability status, and immigration status; and SMSA-level variables.

Table 9. The Effect of Individual, Family, SMSA, and Neighborhood Characteristics on Dropping Out of School.

Variable	*Est. coefficient*	*Odds ratio*
Intercept	-11.02	
Age	0.49*	1.63
(White)		
Asian	-0.42	0.66
Black	-0.67*	0.51
Hispanic	-0.56*	0.57
Boy is immigrant	-0.37*	0.69
Not with both parents	0.60*	1.82
Parental Variables:		
(High school dropout)		
High school graduate	-0.44*	0.64
Some college	-0.23*	0.79
College graduate	-0.49*	0.61
(Manager or professional)		
Sales worker	0.19	1.21
Administrative support	0.16	1.17
Other occupation, n.e.c.	0.02	1.02
No occupation	0.25	1.28
Technician	0.47*	1.60
Precision production	0.32*	1.38
Machine operators, etc.	0.35*	1.42
Nonfarm laborer	0.51*	1.67
Service worker	0.52*	1.68
(Works, receives no welfare)		
Works, receives welfare	0.21	1.23
Disabled	-0.07	0.93
Does not work	0.23*	1.26
Family income (logged)	0.03	1.03
Parent is immigrant	-0.21	0.81
SMSA-level variables:		
% Dropouts in ethnic group	0.0180*	1.018
Returns to education	-0.20*	0.82
Neighborhood variables:		
% Middle class occupations	-0.0191*	0.981
% Over $40,000	-0.0259*	0.974
% College graduates	0.0136	1.014
% Poverty	0.0087*	1.009

* $p<0.05$

Table 10. Nonlinearities (Tipping Points) in the Relationship between Neighborhood Variables and Dropping Out of School.

Panel A. Logistic regression coefficients.

Variable	*Estimated coefficients*	
	(1)	*(2)*
% Middle class occupations	-0.0191*	-0.0192*
% Over $40,000	-0.0259*	-0.0185*
% College graduates	0.0136	0.0099
% Poverty	0.0087*	0.0072*
Middle class-spline at 50%		0.0602*
Poverty-spline at 5%		0.1233*

* $p<0.05$

$^{-}2L.L._{(Equation\ 1)} - {}^{-}2L.L._{(Equation\ 2)}$: 12.891 (d.f.=2, $p<0.01$)

Panel B. Change in the odds ratio associated with a 5 percentage point increase in independent variable.

	Point estimate	*95% Confidence Interval*
% Middle class occupations		
0-50 percent	0.908	0.838-0.985
Over 50 percent	1.227	0.884-1.704
% Over $40,000	0.912	0.854-0.974
% Poverty		
0-5 percent	1.919	1.156-3.195
Over 5 percent	1.037	1.003-1.073

Note: The following variables are also included in the equations: Age, race, ethnicity, immigration status; parent's educational attainment, occupational status, work/welfare/disability status, and immigration status; and SMSA-level variables.

Table 11. Interactions of Neighborhood and Individual Characteristics.

Panel A. Logistic regression coefficients.

Variable	*Coefficient*
% Middle class occupations	-0.0246*
% Over $40,000	-0.0223*
% College graduates	0.0149
% Poverty	0.0191*
Poor * % Middle class occupations	0.0179*
Black * % Over $40,000	0.0325*
Hispanic * % Poverty	-0.0229*

* $p<0.05$

Panel B. Change in odds ratios associated with a 10 percentage point increase in neighborhood variable.

	Point estimate	*95% Confidence interval*
% Middle class occupations		
Overall	0.7818	0.6630-0.9218
Poor	0.9354	0.7153-1.2228
% Over $40,000		
Overall	0.8001	0.7102-0.9013
Black	1.1077	0.7325-1.6748
% Poverty		
Overall	1.2104	1.1181-1.3104
Hispanic	0.9630	0.7845-1.1822

Table 12. Model Including Interactions Between Neighborhood Characteristics and Personal Characteristics, and Neighborhood Ethnic/Racial Variables.

Variable	*Estimated coefficients*	
	(1)	*(2)*
(White)		
Asian	-0.48	-0.48
Black	-0.56*	-0.38
Hispanic	2.42	2.56*
% Middle class occupations	-0.0243*	-0.0260*
% Over $40,000	-0.0226*	-0.0215*
% College graduates	0.0150	0.0155
% Poverty	0.0192*	0.0218*
Poor * % Middle class occupations	0.0179*	0.0180*
Black * % Over $40,000	0.0281	0.0149
Hispanic * % Poverty	-0.0251*	-0.0325*
Predominantly black neighborhood (PBN)		-0.00084
Black * PBN		-0.3159
PBN * % Over $40,000		0.0174
Black * PBN * % Over $40,000	0.0102	0.0157
Predominantly Hispanic neighborhood (PHN)		0.1103
Hispanic * PHN		-0.5453
PHN * % Poverty		-0.0185
Hispanic * PHN * % Poverty	0.0025	0.0350

* $p<0.05$

Note: **PBN** means a neighborhood that is at least half black. **PHN** means a neighborhood that is at least half Hispanic.

Equations also include individual, family, and SMSA-level characteristics.

Table 13. Model Including Interactions Between Neighborhood Characteristics and Personal Characteristics, and Splines.

Variable	*Estimated coefficients* (1)	(2)	(3)
% Middle class occupations	-0.0246*	-0.0192*	-0.0245*
% Over $40,000	-0.0223*	-0.0185*	-0.0173*
% College graduates	0.0149	0.0099	0.0113
% Poverty	0.0191*	0.0072*	0.0171*
Poor * % Middle class occs.	0.0179*		0.0174*
Black * % Over $40,000	0.0325*		0.0272[a]
Hispanic * % Poverty	-0.0229*		-0.0217*
Middle class occs.-spline at 50%		0.0602*	0.0604*
Poverty-spline at 5%		0.0123*	0.0864[b]

* $p<0.05$
[a] $p<0.0794$
[b] $p<0.0787$

Note: Each equation also includes parental education, work status, welfare receipt, parental disability, boy's and parent's immigration status, and SMSA-level variables.

Table 14. Effects of Percentage in Middle Class Occupatins on Dropping Out, Middle Class Variable Coded in Intervals: Includes All Variables in Original Model except Other Neighborhood Variables. (N=22,534)

% Middle Class (1)	Mean % Middle Class (2)	Estimates from logistic regression		Estimates from fitting line through middle 5 intervals†	
		Coefficient (3)	Odds Ratio (4)	Coefficient (5)	Odds Ratio (6)
0-3.5	2.13	0.94	2.57	1.05	2.87
3.51-4.99	4.40	0.92	2.51	1.00	2.71
5-9.99	8.11	0.86	2.37	0.90	2.47
10-19.99	15.38	0.72*	2.06	0.72	2.06
20-29.99	24.82	0.53*	1.70	0.48	1.62
30-39.99	34.49	0.29*	1.34	0.24	1.27
40-49.99	44.33	-0.06	0.94	-0.01	0.99
50+	56.35	0	1	-0.31	0.73

* Coefficient differs significantly from coefficient in next highest interval, $p < 0.05$.

† Regression equation - Logistic regression coefficients (Column 3) for intervals 5-9.99 through 40-49.99 regressed on mean percentage middle class (Column 2) for interval:

Constant 1.1079 X Coefficient -0.0251 R Squared 0.9823

Table 15. Effects of Percentage in Middle Class Occupatins on Dropping Out, Middle Class Variable Coded in Intervals: Hispanics and Boys Who Do Not Live with a Parent Excluded from Sample. Model includes no SMSA-level variables. (N=19,670).

% Middle Class (1)	Mean % Middle Class (2)	Estimates from logistic regression		Estimates from fitting line through middle 5 intervals†	
		Coefficient (3)	Odds Ratio (4)	Coefficient (5)	Odds Ratio (6)
0-3.5	2.14	1.08	2.94	1.14	3.14
3.51-4.99	4.38	0.91	2.48	1.08	2.95
5-9.99	8.21	0.96	2.62	0.98	2.65
10-19.99	15.51	0.77*	2.16	0.78	2.17
20-29.99	24.86	0.54*	1.72	0.52	1.68
30-39.99	34.50	0.27	1.31	0.25	1.29
40-49.99	44.32	-0.04	0.96	-0.02	0.98
50+	56.35	0	1	-0.35	0.71

* Coefficient differs significantly from coefficient in next highest interval, $p < 0.05$.

† Regression equation - Logistic regression coefficients (Column 3) for intervals 5-9.99 through 40-49.99 regressed on mean percentage middle class (Column 2) for interval:

Constant	1.2018	X Coefficient	-0.0275	R Squared	0.9978

Appendix Table 1. Interactions between Individual Attributes and Neighborhood Characteristics - Interactions Entered One at a Time. (Each line is a separate equation.)

Variable	*Estimated coefficient*
Hispanic * % Middle class	0.0166*
Hispanic * % Over $40,000	0.0283*
Hispanic * % Poverty	-0.0209*
Black * % Middle class	0.0126
Black * % Over $40,000	0.0228
Black * % Poverty	0.0031
Poor * % Middle class	0.0192*
Poor * % Over $40,000	0.0163
Poor * % Poverty	-0.0017
Not with 2 Parents * % Middle class	-0.0029
Not with 2 Parents * % Over $40,000	-0.0080
Not with 2 Parents * % Poverty	-0.0059
Immigrant * % Middle class	-0.0004
Immigrant * % Over $40,000	0.0326*
Immigrant * % Poverty	-0.0194

* $p<0.05$

Note: Each equation includes personal and family characteristics, SMSA-level variables, neighborhood characteristics, and interactions of BLACK, HISPANIC, and POOR with family and individual attributes.

Appendix Table 2. Neighborhood Interactions Considered Simultaneously. (Each column is a separate equation.)

Variable	*Estimated coefficients*		
	(1)	*(2)*	*(3)*
Hispanic * % Middle class occs.	0.0002		
Hispanic * % Over $40,000	-0.0012		
Hispanic * % Poverty	-0.0190*	-0.0200*	-0.0229*
Poor * % Middle class occs.	0.0185*	0.0186*	0.0179*
Immigrant * % Over $40,000	0.0294		
Black * % Over $40,000			0.0325*
* $p<0.05$			

Note: Each equation includes personal and family characteristics, SMSA-level variables, neighborhood characteristics, and interactions of BLACK, HISPANIC, and POOR with family and individual attributes.

Appendix Table 3. Interactions Between Neighborhood Characteristics and Personal Characteristics, Shown with Individual and Family Characteristics.

Variable	*Estimated coefficient*
Intercept	-11.65
Age	0.53*
(White)	
Asian	-0.48
Black	-0.55*
Hispanic	2.40
Not with 2 parents	0.71*
Parental Variables:	
(Professional or manager)	
Sales	0.19
Clerical	0.11
Other occupations	-0.06
No occupation	0.23
Technical worker	0.30
Craft worker	0.32*
Operator	0.46*
Nonfarm laborer	0.60*
Service worker	0.45*
Black * Not with 2 parents	-0.38*
Black * Operator	-0.95*
Black * Nonfarm laborer	-0.72*
Hispanic * age	-0.15*
Hispanic * technical worker	1.18*
Poor * Not with 2 parents	-0.33*
Neighborhood variables:	
% Middle class occupations	-0.0246*
% Over $40,000	-0.0223*
% College graduates	0.0149
% Poverty	0.0191*
Poor * % Middle class occs.	0.0179*
Black * % Over $40,000	0.0325*
Hispanic * % Poverty	-0.0229*

* $p<0.05$
Omitted categories in parentheses.
$-2L.L._{(\text{Equation 1})}$ compared with equation with no interaction terms: 57.036 (d.f.=9, $p<0.001$)

Note: Each equation also includes parental education, work status, welfare receipt, parental disability, boy's and parent's immigration status, and SMSA-level variables.

Figure 1. Dropping Out by Percentage Middle Class
Full Sample, Includes SMSA-level Variables.

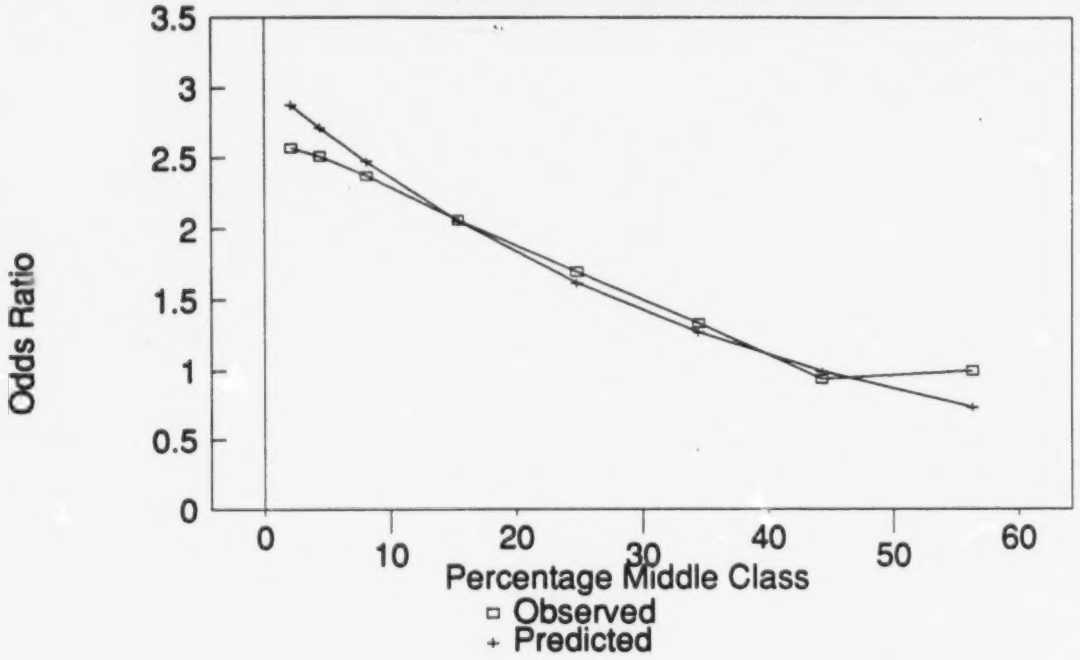
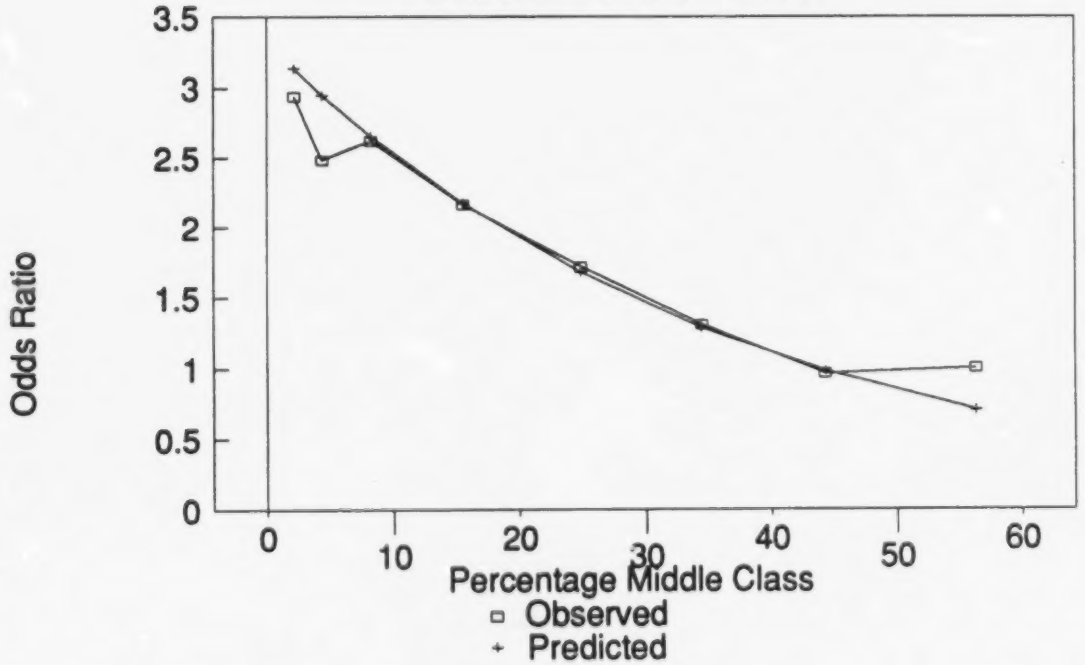


Figure 2. Dropping Out by Percentage Middle Class
Excludes Hispanics and Boys Who Do Not Live with a Parent,
Excludes SMSA-level Variables.



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